

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 1
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

INDEX

1.0	SCOPE	
1.1	PRODUCTS COVERED	Page 2
1.2	NEW VS USED PRODUCTS	Page 2
1.3	PURPOSE	Page 2
1.4	USE	Page 2
2.0	REFERENCED SPECIFICATIONS	Page 3
3.0	INSPECTION REQUIREMENTS	
3.1	VISUAL INSPECTION	Page 3
3.2	MAGNETIC PARTICLE INSPECTION	Page 3
3.3	INSPECTION PERSONNEL QUALIFICATION	Page 3
3.4	INSPECTION REGIONS	Page 3
3.5	ACCEPTANCE CRITERIA	Page 3
4.0	GENERAL PRODUCT ACCEPTANCE CRITERIA	
4.1	INDICATIONS VS RELAVENT INDICATIONS	Page 3
4.2	RE-EXAMINATION OF INDICATIONS	Page 4
4.3	LINEAR INDICATIONS	Page 4
4.4	EXAMINATION & MEASURING DEVICES	Page 4
4.5	UNACCEPTABLE INDICATIONS	Page 4
4.6	HARDMETAL INDICATIONS	Page 4
4.7	BLADE INDICATIONS	Page 4
4.8	BASEMETAL INDICATIONS	Page 4
4.9	WEAR AND PHYSICAL DAMAGE	Page 4
5.0	SPECIFIC PRODUCT ACCEPTANCE CRITERIA	
5.1	WATERMELON, TAPERED AND STRING MILLS	Page 5
5.2	MILL (ROTARY) SHOES	Pages 5 - 6
5.3	JUNK, PACKER AND WINDOW MILLS	Page 6
5.4	PILOT MILLS	Pages 6 - 7
5.5	WHIPSTOCK STARTER (INCLUDING CPE) MILLS	Page 7
5.6	SECTION MILL KNIVES AND UNDERREAMER AND OTHER BLADES	Pages 7-8
5.7	QUICKCUT LEAD MILL	Pages 8-9
5.8	QUICKCUT FLEX MILL	Pages 9-10
5.9	QUICKCUT SECONDARY & STEERING MILL	Pages 10-11
6.0	APPENDIX I: INSPECTION LOCATIONS AND INDICATION ORIENTATIONS	
6.1	WATERMELON, TAPERED AND STRING MILLS	Pages 11-12
6.2	MILL (ROTARY) SHOES	Pages 13-14

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 2
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

6.3	JUNK, PACKER AND WINDOW MILLS	Pages 14 - 17
6.4	PILOT MILLS	Pages 17 - 18
6.5	WHIPSTOCK STARTER (INCLUDING CPE) MILLS	Pages 19 - 20
6.6	SECTION MILL KNIVES AND UNDERREAMER AND OTHER BLADES	Pages 20 - 21
6.7	QC Lead Mill, Flex Mill, Secondary Mill, Steering Mill	Pages 22 - 25
7.0	APPENDIX II TERMINOGLOY AND METHODS OF MEASUREMENT	
7.1	DEFINITIONS	Page 24
7.2	INDICATION DIMENSIONING	Page 25
7.3	MEASURING INDICATIONS	Page 25
7.4	EXAMINATION MEDIUMS	Page 26
7.5	GRINDING INDICATIONS	Page 27

1.0 SCOPE

- 1.1 This specification pertains to surface inspection requirements for milling and cutting equipment. The techniques required are visual inspection and dry or wet magnetic particle inspection (MPI). When there is an apparent conflict or difference between this specification and a referenced specification, this specification shall govern.
- 1.2 The inspection requirements defined herein are applicable to newly manufactured and repaired milling and cutting equipment. The acceptance criteria defined herein are requirements that apply to new and used/redressed milling and cutting equipment.
- 1.3 The purpose of this inspection document is to provide Weatherford and its subcontractors with inspection and acceptance criteria that apply to cutting and milling products that contain hardsurfaced regions that perform the milling and cutting operations. At the time this document was created, there were no industry specifications that were applicable to this class of tools. This document was created because of the historical inspection problems that include identification of inspection criteria and acceptable indication types and limits in the hardsurfaced regions.
- 1.4 Use of this Specification: This procedure covers the inspection and acceptance of hardsurfaced regions on milling and cutting tools. The inspector shall perform the visual and magnetic particle inspections described in Section 3. For acceptance criteria, the inspector shall first examine the indications and acceptance criteria defined in Section 4. For indication locations and acceptance criteria that are not sufficiently in Section 4, the inspector then examines the relevant paragraphs of Section 5 for the specific products being examined. The inspector should refer to the reference Figures in the Appendix to become familiar with the inspection locations and indication type and appearances.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 3
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

2.0 REFERENCED SPECIFICATIONS

- 2.1 API Specification 7-1: Specification for Rotary Drill Stem Elements
- 2.2 ASNT SNT-TC-1A: Personnel Qualification and Certification in Nondestructive Testing
- 2.3 WT-105 Wet Magnetic Particle Inspection.
- 2.4 DS-1: Drill Stem Design and Inspection (TH Hill)

3.0 INSPECTION REQUIREMENTS

- 3.1 Visual Inspection: All mill and cutting tool exterior surface areas (see Paragraph 3.4) are examined for indications. The primary indication of concern is cracks in basemetal. Visual indications shall be marked for further examination. Visual indications of wear and damage shall be marked for further examination.
- 3.2 Magnetic Particle Inspection: Inspect the OD surfaces (see Paragraph 3.4) defined in this document using magnetic particle inspection procedures specified in WT-105. The inspection shall be conducted twice with the second inspection employing the magnetic field oriented perpendicular to the first inspection. The relevant indication size is defined as 1/16" in length or greater.
- 3.3 Personnel Qualification: Personnel performing examinations shall be qualified and certified in accordance with the requirements specified in Recommended Practice SNT-TC-1A or ISO 9712
- 3.4 Inspection Regions: The regions are described with the Acceptance Criteria in Section 4 and generally include: (1) regions between the hardsurfaced blades, (2) transition areas, and (3) suspect regions detected through visual inspection. Photographs depicting the inspection locations and indication orientations are presented in Appendix I.
- 3.5 Acceptance Criteria: The acceptance criteria for hardsurfaced regions of milling equipment are defined in the Sections 4 and 5.
- 3.6 Evaluation and Disposition: All relevant indications that are non-acceptable in section 4 and 5 shall be marked for evaluation and disposition by a Weatherford designated fishing tool SME. The fishing tool SME will decide based on indication location, orientation, size, tool usage and tool history. Each Fishing Tool location shall have a designated SME for these dispositions. If an appropriate local SME is not available, a WISE query shall be submitted.

4.0 GENERAL PRODUCT ACCEPTANCE CRITERIA

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 4
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

- 4.1 An indication may be the evidence of a surface imperfection. All indications need not be relevant. Relevant indications are those caused by flux leakage resulting from a discontinuity such as a crack.
- 4.2 Any indication which is believed to be non-relevant shall be re-examined again. Only indications having a major dimension of greater than one sixteenth of an inch shall be considered relevant.
- 4.3 A linear indication is defined as an indication that has a length three times or more than its width. A rounded indication is shape with a length equal to or less than its width. (See Appendix II, section 7.1.1 for proper definition and measurement of indications for this procedure- No Pg. 24).
- 4.4 Mechanical discontinuities at the surface will be indicated by the retention of the examination medium, or by calibrated measuring devices. All indications are not necessarily relevant indications since certain metallurgical discontinuities and magnetic permeability variations may also produce similar indications which are not relevant to the detection of unacceptable discontinuities (see appendix II, section 7.1.4 for methods of measuring indications and examination mediums- No Pg. 26).
- 4.5 If instructed by a Weatherford fishing tool SME, relevant and unacceptable indications shall be removed by grinding or machining and shall be re-tested if the repaired surface is free of sharp notches are corners / grinding marks. When an indication appears to be fully removed the area can be re-examined by the same method and evaluated by the same acceptance criteria. Area shall be blended into the surrounding surface so as to avoid sharp notches, crevices or corners (see Appendix II , section 7.1.5 for grinding tools and techniques- No Pg. 27).
- 4.6 Hardmetal Indications: Subject to the individual product limitations defined in Section 5, indications in hardmetal are generally acceptable provided the following are true: (1) indications remain in the hardmetal except as permitted by Paragraph 4.2, (2) indications do not exceed a opening size (gap) of 3/32" maximum, and (3) cracks do not propagate through more than one hardsurfaced region.
- 4.7 Blade Indications: Indications on integral and welded blades are limited to 3/32" from the edge of the hardsurfacing provided (1) indication does not appear on both sides of blade and (2) additional limitations of Section 5 for the specific product are not exceeded.
- 4.8 Basemetal Indications: With the exception of the few specific locations/products defined in Section 5, indications that are located in the bodies, and transition regions are not acceptable. Indications may be ground to 0.040" to investigate nature of indications. Any crack like indications on end connection threads are not permitted and cause for rejection. Connection may be recut if the tong space or fish neck length, as applicable meets the minimum length requirements in DS-1 volume 3.
- 4.9 Wear and Physical Damage: This is outside the scope of this document. Damage and acceptance criteria other than the milled and cutting region shall be inspected and evaluated per DS-1 category 3-5 for milling and cutting tools. It is permissible to use another inspection standard such as NS-2 or NS-1 if required based on the Weatherford location and/or customer requirement.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimilies hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 5
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

5.0 PRODUCT SPECIFIC ACCEPTANCE CRITERIA

5.1 Watermelon, Tapered and String Mills: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.

5.1.1 Transition zone location: No relevant indications. This indication and location is presented in Figure 6.1.1.

5.1.2 Axial indications in basemetal: No relevant indications. Repair to be per limits of API Specification 7-1. This indication and location is presented in detail "a" in Figure 6.1.3.

5.1.3 Between blades in basemetal: No relevant indications. This indication and location is presented in detail "a" in Figure 6.1.2 and Figure 6.1.3.

5.1.4 Hardmetal on blade location (circumferential or transverse direction): All indications narrower than 3/32" in the hardmetal are acceptable. The width is permissible to the width of the blade. This indication and location is presented in detail "b" in Figure 6.1.2.

5.1.5 Hardmetal on blade location (axial or longitudinal direction): Indications are acceptable up to a maximum length of 3/32".

5.1.6 Regions adjacent to hard metal on the blades: Indications greater than 1/4" or 25% of blade height, whichever is less, are evaluated by grinding 0.040" deep to investigate nature of indications. One indication greater than 1/4" but less than 25% of blade height adjacent to hardmetal on the blade is permitted per 6" of blade length on one side of blade only. Indications that are oriented in the longitudinal direction are limited to 3/32" maximum length. Relevant indications that are present on both sides of the blade are unacceptable.

5.2 Mill (Rotary) Shoes: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.

5.2.1 Transition zone location: No relevant indications. An example of this type of indication and location is presented in Figure 6.1.1.

5.2.2 Regions between hardsurfaced edges in basemetal: No relevant indications. This indication and location is presented in details "a" in Figure 6.2.1.

5.2.3 On tops (edges) of mills (rotary shoes) that are hardsurfaced and adjoin carbide tiles: Relevant linear indications are polished; Indications that propagate into the basemetal are unacceptable.

5.2.4 On ID sides of hardsurfaced sections: Relevant indications are reinspected using dry magnetic

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 6
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

particle on the OD; relevant linear indications are unacceptable. No Indications with openings wider than 3/32". This indication and location is presented in detail "a" in Figure 6.2.

5.2.5 On OD sides of hardsurfaced sections: Relevant indications are reinspected using dry magnetic particle on the ID; relevant linear indications are unacceptable. No Indications with openings wider than 3/32". For sides of hardsurfaced sections –Indications in the hardmetal that hook or turns circumferential are unacceptable. This indication and location is presented in detail "b" in Figure 6.2.1.

5.3 Junk, Packer and Window Mills: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.

5.3.1 Transition zone location: No relevant indications. This indication and location is presented in Figure 6.3.3.

5.3.2 On hardsurfaced blades: Cracks that propagate through more than one blade are unacceptable.

5.3.3 On back of blades that are steel: Cracks are acceptable as long as (a) the crack opening is no greater than 1/32", (b) the length of the crack is no greater than 30% of the blade height or 3/8", and whichever is greater. This indication and location is presented in details "a" and "b" in Figure 6.3.2.

5.3.4 For flow ports and watercourses: Cracks are acceptable with an opening size equal to or less than 1/32". This indication and location is presented in Figure 6.3.6.

5.3.5 Between blades in basemetal: No relevant indications. This indication and location is presented in detail "b" in Figure 6.3.2 and in Figure 6.3.7

5.3.6 Hardmetal on blade location: All cracks narrower than 3/32" in the hardmetal is acceptable. This indication and location is presented in detail in Figures 6.3.1 and 6.3.5.

5.3.7 Relevant Indications that are cracks that propagate into the body of the mill are unacceptable. Relevant indications that are cracks in the hardmetal and are oriented in the circumferential direction are unacceptable. Examples of these indications are presented in Figure 6.3.4.

5.4 Pilot Mills: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.

5.4.1 Transition zone location: No relevant indications. This indication and location is presented in Figure 6.4.1.

5.4.2 On hardmetal blades: the maximum Indication length is 3/32" oriented in the longitudinal direction.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 7
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

- 5.4.3 On back of blades that are steel: Cracks are acceptable as long as (a) the Indication opening is no greater than 1/32" and (b) the length of the Indication is no greater than 30% of the blade height or 3/8", whichever is greater. This indication and location is presented in Figure 6.4.3.
- 5.4.4 On the faces of hardsurfaced blades: Circumferentially oriented Indications are acceptable up to as long as they do not propagate into the basemetal, this is depicted in detail "a" in Figure 5.4.2. Longitudinally oriented relevant indications are unacceptable; this is depicted in detail "b" in Figure 6.4.2.
- 5.4.5 Between blades in basemetal: No relevant indications. This indication and location is presented in details "c" and "d" in Figure 6.4.2
- 5.5 Whipstock Starter Mills (including CPE mills): These products are inspected at the locations listed with acceptance criteria defined in the following Sections.
 - 5.5.1 Transition zone location: No relevant indications. An example of this indication and location is presented in Figure 6.4.1.
 - 5.5.2 On hardsurfaced faces: Indications are acceptable as long as (a) the Indication opening is no greater than 1/32" and (b) the length of the Indication is no greater than 30% of the blade height or 3/8", whichever is greater. This indication and location is presented in Figure 6.5.1.
 - 5.5.3 On hardsurfaced blades: Indications that appear to propagate through more than one blade are unacceptable. Indications that propagates between the blades into the basemetal are unacceptable. Indications that propagate into the steel blade but not the body are acceptable up to 1/8" length. An example of this indication and location is presented in detail "a" in Figure 6.5.2.
 - 5.5.4 Load bearing holes and regions in basemetal between blades: No relevant indications.
- 5.6 Section Mill Knives, Cutter Knives, Under Reamer Blades and other Blades: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.
 - 5.6.1 Pin hole locations: No relevant indications. This indication and location is presented in detail "b" in Figure 6.6.2.
 - 5.6.2 On hardsurfaced faces: Indications are acceptable as long as (a) the Indication opening is no greater than 1/32", (b) the length of the Indication is no greater than 10% of the blade height or 1/4", or whichever is greater. This indication and location is presented in detail "a" in Figure 6.6.1.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 8
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

5.6.3 Structural Base Metal: For these products, structural base metal is defined as areas of the component which could result in loss of all or a significant part of a pinned-on component if it fails. No relevant indications.

5.6.3.1 For cutter knives with length to height ratio greater than 2.5, structural base metal is the areas that lie within two pin hole diameters from edge of pin hole. No relevant indications. These locations are presented in Figure 6.6.4.

5.6.3.2 For cutter knives with length to height ratio less than 2.5, structural base metal is the areas that lie within one pin hole radial wall thickness from edge of pin hole. No relevant indications. These locations are presented in Figure 6.6.5.

5.6.4 Non-Structural Base Metal: Non-structural base metal is defined as areas located outside the structural base metal excluding hardsurface metal. These indications and locations are presented in detail b in Figure 6.6.1, detail a in 6.6.2 and detail a and b in Figure 6.6.3.

5.6.4.1 Cracks in non-structural base metal are acceptable if they originate from a hardsurface metal and are not longer or deeper than 0.25 inches or 10% of non-structural base metal thickness, whichever is less. When measuring crack length or depth, measure from the joint between hardsurface metal and base metal to the tip of the crack. These indications and locations are presented in detail a in Figure 6.6.2 and detail a in 6.6.3.

5.6.5 Repair of Cracks: Cracks and crack like indications are repairable by welding provided they are repaired in accordance with the manufacturers written weld procedure specification. Cracks or discontinuities within hardsurface metal areas may be redressed by brazing with tinning rod consistent with original dressing procedures.

5.6.5.1 Cracks in base metal that does not originate in either a weld metal or hardsurface metal area may not be repaired by welding or brazing.

5.6.5.2 Cracks in areas that may not be repaired by welding or brazing may be removed by grinding or machining if practical and the surface shall be finished to be free of sharp corners.

5.6.5.3 Cracks longer or deeper than 0.5 inches or 20% of non-structural base metal thickness, whichever is less, may not be repaired.

5.7 QC Lead Mill: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.

5.7.1 Hard surfaced metal: Indications and similar indications are acceptable in hard faced area if they are no longer then ¼: in length. See Fig 6.3.1& 6.3.5.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimilies hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 9
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

- 5.7.2 Reduced Neck diameters adjacent to Pilot and bladed areas: Refer Fig 6.7.1. Indications on diameter (A) & (B) can be machined down to the below limits. If the diameter machining facility is not available hand grinding and other similar material removal processes can be used. However in such cases care should be taken to blend the ground area to remove sharp edges and corners as to not act as stress risers. If the Indications still exist after material removal, the mills shall be rejected.
- 5.7.2.1.1 Lead Mill for 4-1/2 to 6-5/8 Casing sizes: 1/8" deep on diameter A and 1/16" deep on diameter B.
 - 5.7.2.1.2 Lead Mill for 7 to 7-5/8 Casing sizes: 1/4" deep on diameter A and 1/16" deep on diameter B
 - 5.7.2.1.3 Lead Mill for 8-5/8 to 10-3/4 Casing sizes: 5/16" deep on diameter A and 1/16" deep on diameter B.
 - 5.7.2.1.4 Lead Mill for 13-3/8 to 20 Casing sizes: 5/16" deep on diameter A and 1/4" deep on diameter B.
- 5.7.3 Base metal between blades: Any indication in circumferential direction (See Fig 6.7.1.D) shall be ground to depths given below. No such indications are acceptable and the mill shall be rejected if the machining / grinding does not remove the Indication. Longitudinal Indications (See Fig 6.7.1.C) are acceptable as long as they follow the below criteria.
- 5.7.3.1.1 Lead Mill for 4-1/2 to 7 Casing sizes: A total of 3 Indications with maximum length of .38" each between two blades. The area can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.7.3.1.2 Lead Mill for 7-5/8 to 10-3/4 Casing sizes: A total of 5 Indications with maximum length of .5" each between two blades. The area can be ground .12 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.7.3.1.3 Lead Mill for 13-3/8 to 20 Casing sizes: A total of 7 Indications with maximum length of .5" each between two blades. The area can be ground .15 deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.7.4 Non-Structural Base Metal heat cracks: (See Fig 6.7.1.E)

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2022, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 10
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

- 5.7.4.1.1 Lead Mill for 4-1/2 to 7 Casing sizes: Indication upto .38" long are acceptable. For longer cracks the area can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.7.4.1.2 Lead Mill for 7-5/8 to 10-3/4 Casing sizes: Indication upto .5" long are acceptable. For longer cracks the area can be ground .12" deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.7.4.1.3 Lead Mill for 13-3/8 to 20 Casing sizes: Indication upto .5" long are acceptable. For longer Indications the area can be ground .15 deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.7.5 Jam nut port and Circulation port: Cracks are acceptable if they are less than or equal to .50" in length. This indication and location is presented in Figure 6.7.2.A & 6.7.2.B
- 5.8 QC Flex Mill: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.
 - 5.8.1 Hard surfaced metal: Indications are acceptable in hard faced area as long as they are no longer than 1/4" in length. See Fig 6.3.1 & 6.3.5.
 - 5.8.2 Base metal between blades: Any indication in circumferential direction (See Fig 6.7.3.A) shall be ground to depths given below. No such indications are acceptable and the mill shall be rejected if the grinding does not remove the Indication. Longitudinal Indications (See Fig 6.7.3.B) are acceptable as long as they follow the below criteria.
 - 5.8.2.1.1 Flex Mill for 4-1/2 to 7 Casing sizes: A total of 3 Indications with maximum length of .38" each between two blades. The area can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.8.2.1.2 Flex Mill for 7-5/8 to 10-3/4 Casing sizes: A total of 5 Indications with maximum length of .5" each between two blades. The area can be ground .12 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.8.2.1.3 Flex Mill for 13-3/8 to 20 Casing sizes: A total of 7 Indications with maximum length of .5" each between two blades. The area can be ground .15 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.8.3 Non-Structural Base Metal heat cracks: (See Fig 6.7.3.C)

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 11
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

- 5.8.3.1.1 Flex Mill for 4-1/2 to 7 Casing sizes: Indications up to .38" long are acceptable. For longer cracks the area can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.8.3.1.2 Flex Mill for 7-5/8 to 10-3/4 Casing sizes: Indications up to .5" long are acceptable. For longer cracks the area can be ground .12" deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.8.3.1.3 Flex Mill for 13-3/8 to 20 Casing sizes: Indications up to .5" long are acceptable. For longer cracks the area can be ground .15 deep to meet this criteria if required. Otherwise the mill shall be rejected.
- 5.9 QC Secondary Mill & Steering Mill: These products are inspected at the locations listed with acceptance criteria defined in the following Sections.
 - 5.9.1 Hard surfaced metal: Indications and similar indications are acceptable in hard faced area as long as they are no longer than 1/4" in length. See Fig 6.3.1 & 6.3.5.
 - 5.9.2 Base metal between blades: Any indication in circumferential direction (See Fig 6.7.4. & 6.7.5. A) Shall be ground to depths given below. No such indications are acceptable and the mill shall be rejected if the grinding does not remove the Indication. Longitudinal Indications (See Fig 6.7.4. & 6.7.5. B) Resembling thin heat cracks are acceptable as long as they follow the below criteria.
 - 5.9.2.1.1 Secondary Mill & Steering Mill for 7 to 9-5/8 Casing sizes: A total of 3 Indications with maximum length of .38" each between two blades. The area can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.9.2.1.2 Secondary Mill & Steering Mill for 10-3/4 to 13-3/8 Casing sizes: A total of 5 Indications with maximum length of .5" each between two blades. The area can be ground .12 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.9.3 Non-Structural Base Metal heat cracks: (See Fig 6.7.4. & 6.7.5.C)
 - 5.9.3.1.1 Secondary Mill & Steering Mill for 7 to 9-5/8 Casing sizes: Indications up to .38" long are acceptable. For longer cracks can be ground .09 deep to meet this criteria if required. Otherwise the mill shall be rejected.
 - 5.9.3.1.2 Secondary Mill & Steering Mill for 10-3/4 to 13-3/8 Casing sizes: Indications up to .5" long are acceptable. For longer cracks can be ground .12 deep to meet this criteria if required. Otherwise the mill shall be rejected.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 12
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

Note: Applicable for QuickCut Mills (Sections: 5.7, 5.8 & 5.9)

- All Indications originating in an angle 0° to 45° from mill axis as considered as longitudinal cracks.
- All Indications originating in an angle 45° to 90° from mill axis as considered as circumferential cracks.
- All machining / grinding limits given for Indication removal are per side depths.

6.0 APPENDIX I – INSPECTION LOCATIONS AND DEFINITIONS OF INDICATION ORIENTATION

This Appendix contains photographs that define potential indication orientations at the inspection locations applicable for each product category.

6.1 Watermelon, String and Tapered Mills

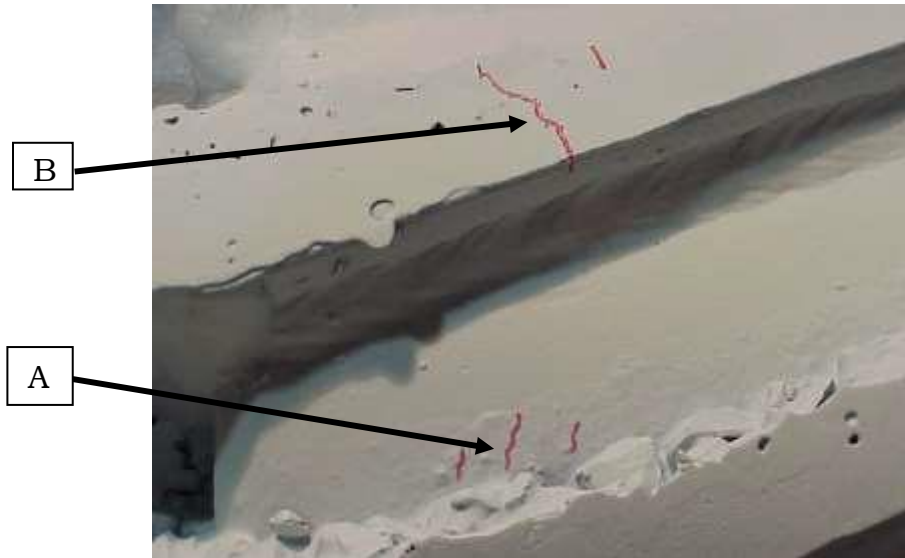


6.1.1 Figure: Carbide Surfaced Blade at Transition Region; Depicted indications in the transition region

Uncontrolled unless stamped with a RED “Q”. © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 13
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.1.2 Figure: Carbide Surfaced Blade; Depicted are (a) circumferential (or angled) indications between the blades and (b) circumferential indications across a hardsurfaced blade.



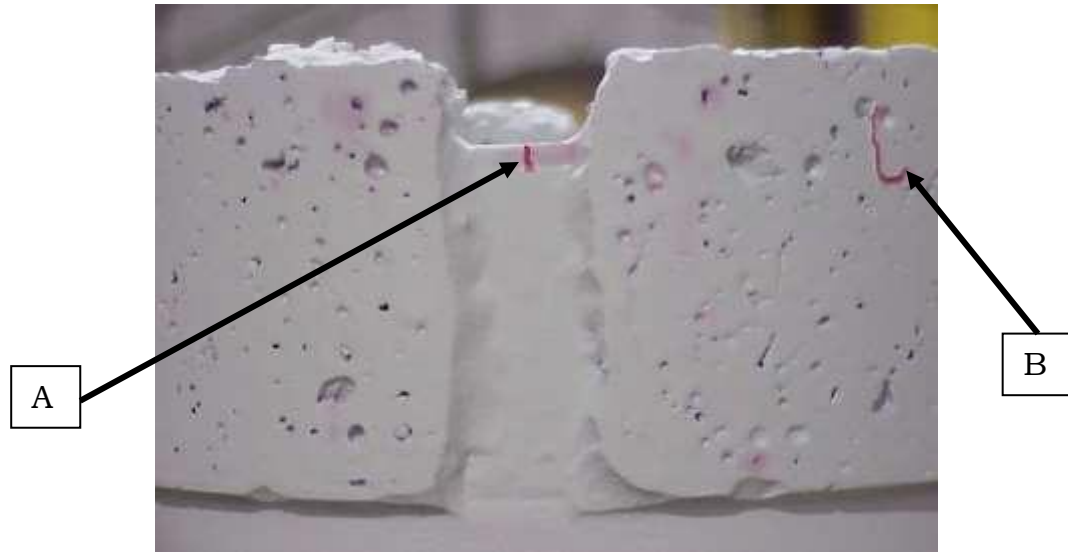
6.1.3 Figure: Close-up of Carbide Surfaced Blade; Depicted is a longitudinal (axial) indication in the basemetal adjacent to a hardsurfaced blade.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

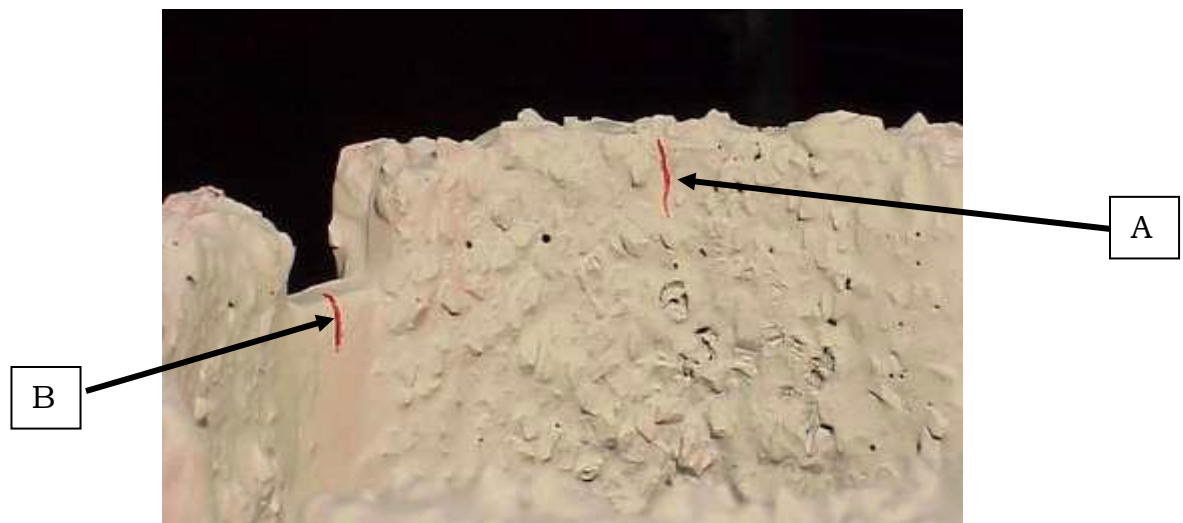
This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 14	APPROVAL:  9/13/2022
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						

6.2 Mill (Rotary) Shoe



6.2.1 Figure: Side of Mill (Rotary) Shoe; Depicted are (a) indications in basemetal, (b) longitudinal indications in carbide that turn or hook in the circumferential direction.



6.2.2 Close-up Figure of Mill (Rotary Shoe) Carbide Region; Depicted are (a) indications in carbide on ID surface and (b) indications in basemetal.

6.3 Junk, Packer and Window Mills

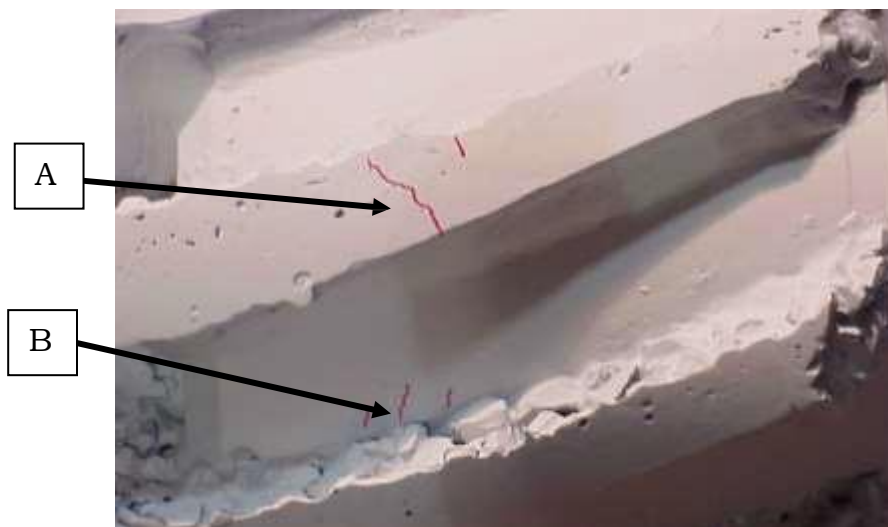
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 15
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.3.1 Figure of Top of Window Mill; depicted is an indication on top of hardsurfaced blade.



6.3.2 Figure of Side of Window Mill; depicted are (a) indications on top of hardsurfaced blade and (b) transverse (circumferential) indications in basemetal between blades.

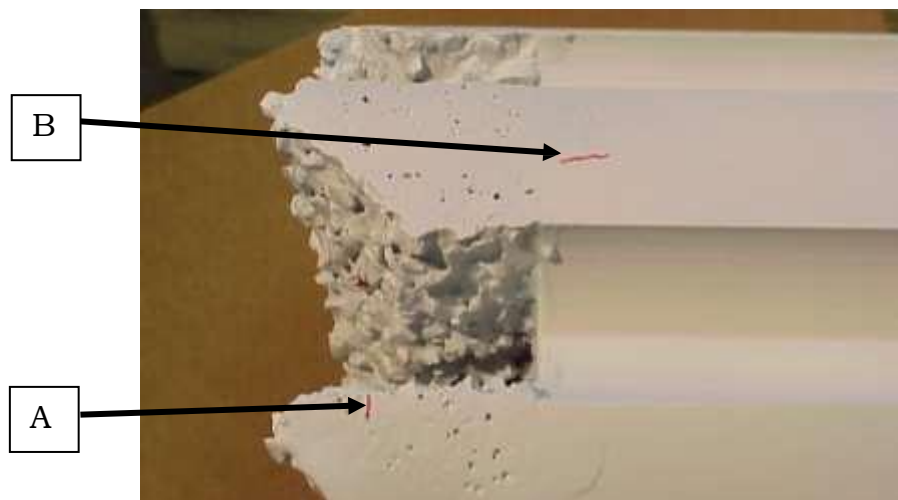
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford. upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 16
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.3.3 Figure of Side of Window Mill in Transition Region; depicted are indications in transition region in basemetal.



6.3.4 Close-up Figure of Side of Junk Mill; depicted are (a) circumferential indications on side of blade (hardsurfacing), (b) indications on side of blade (propagating from hardmetal into blade metal).

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 17
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.3.5 Figure of Top or Head of Window Mill; depicted is an indication on top of hardsurfaced blade.



6.3.6 Figure of Top or Head of Window Mill; depicted are indications in basemetal from fluid port.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 18
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.3.7 Figure of Side of Window Mill; depicted is an indication of a longitudinal indication in the basemetal near the base of a hardsurfaced blade

6.4 Pilot Mills

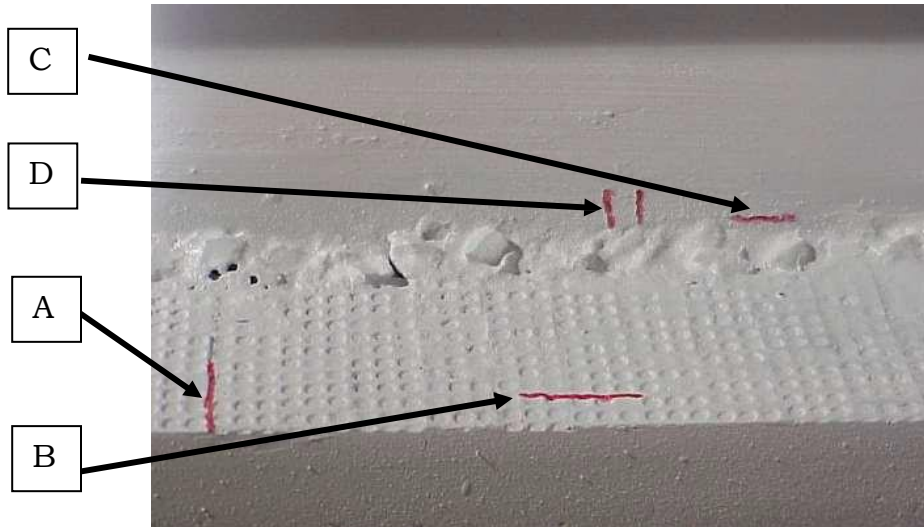


6.4.1 Figure of Side of Pilot Mill in Transition Region; depicted is a longitudinal indication in basemetal propagating from blade in transition region.

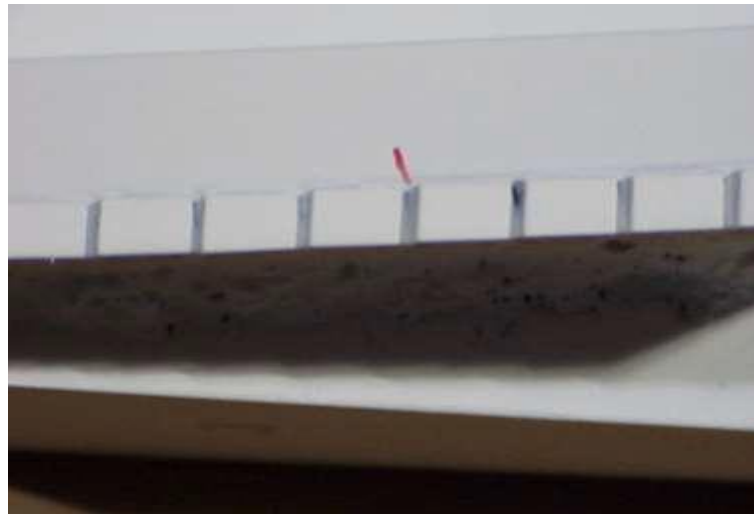
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 19
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.4.2 Figure of Side of Pilot Mill towards Transition Region; depicted are (a) circumferential and (b) longitudinal indications in carbide on face of blade and (c) longitudinal and (d) circumferential indications in basemetal next to base of blade.



6.4.3 Figure of Top of Pilot Mill With Steel Face; depicted is an indication propagating from the carbide into the steel blade.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

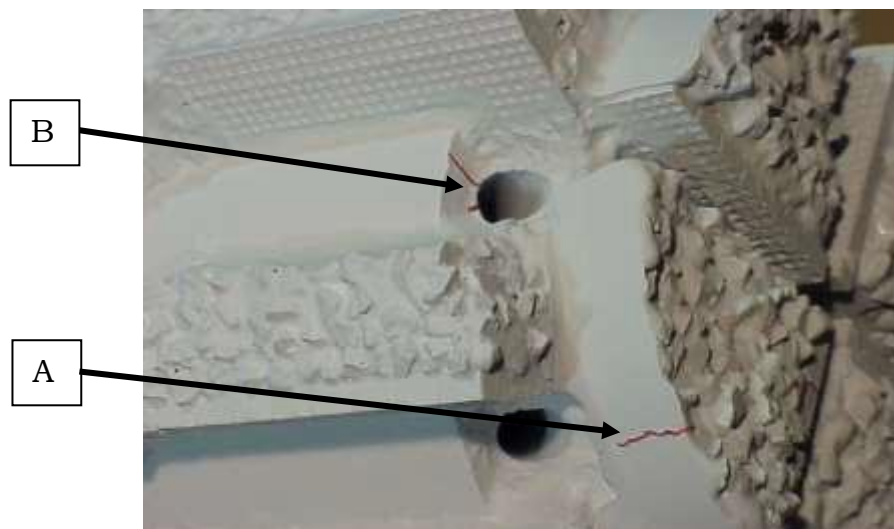
This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					APPROVAL:  9/13/2022
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 20	
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						

6.5 Whipstock Starter Mills



6.5.1 Figure of Top or Head of Mill; depicted is an indication on top of hardsurfaced blade.



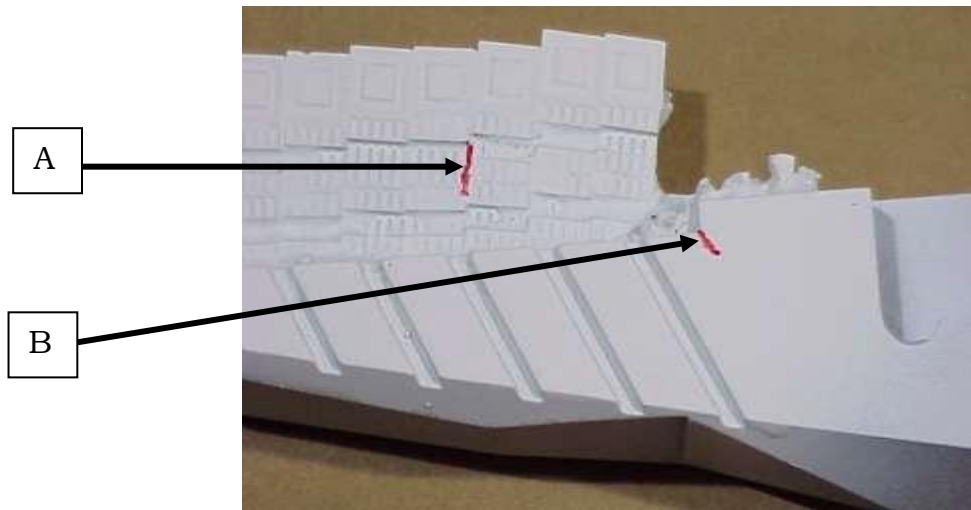
6.5.2 Figure of Side of Head of Mill; depicted are (a) indication on carbide propagating into the steel basemetal and (b) basemetal indications from fluid port.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

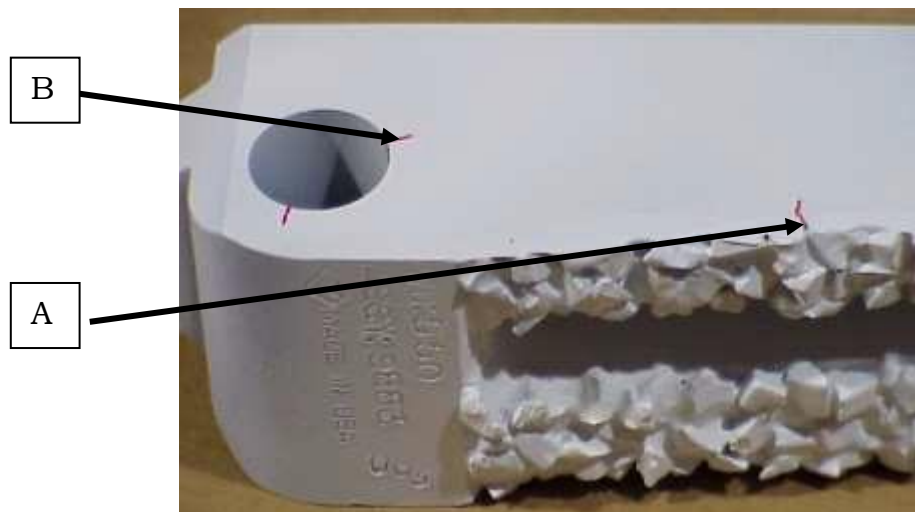
This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 21	APPROVAL:  9/13/2022
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						

6.6 Section Mill Knives, Cutter Knives, Back Reamer Blades and Other Blades



6.6.1 Figure of Section Mill Knife Face; depicted are (a) indication in hardmetal/carbide tiles and (b) indications in basemetal from radius of mill.

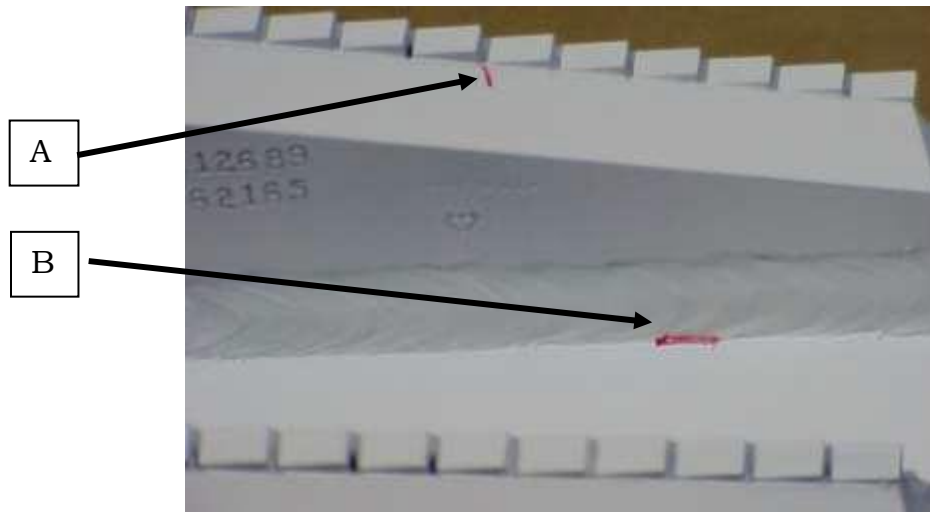


6.6.2 Figure of Section Mill Knife Face; depicted are (a) indication in hardmetal propagating into basemetal and (b) indications oriented from pinhole.

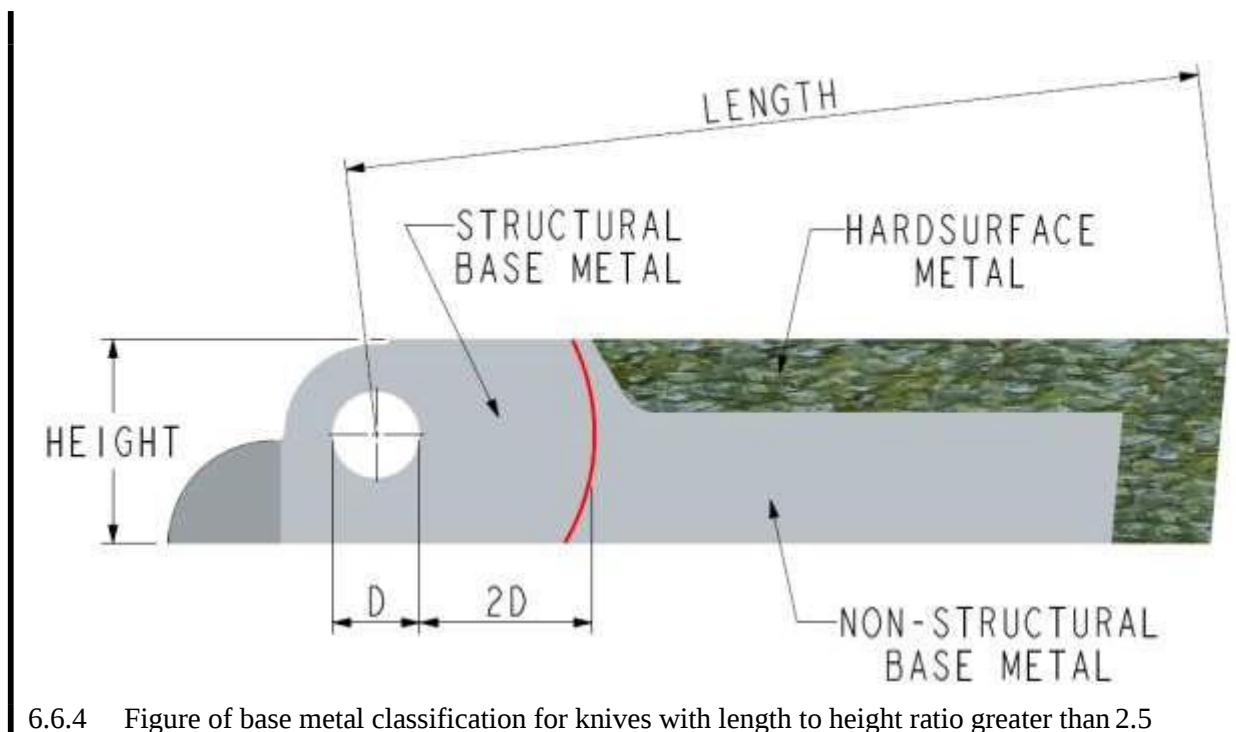
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					APPROVAL:  9/13/2022
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 22	
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						



6.6.3 Figure of Body of Section Mill Knife; depicted are (a) an indication in the basemetal on the top of the blade (propagating from carbide) and (b) an indication in the toe of the fabrication weld joining the blade to the body.

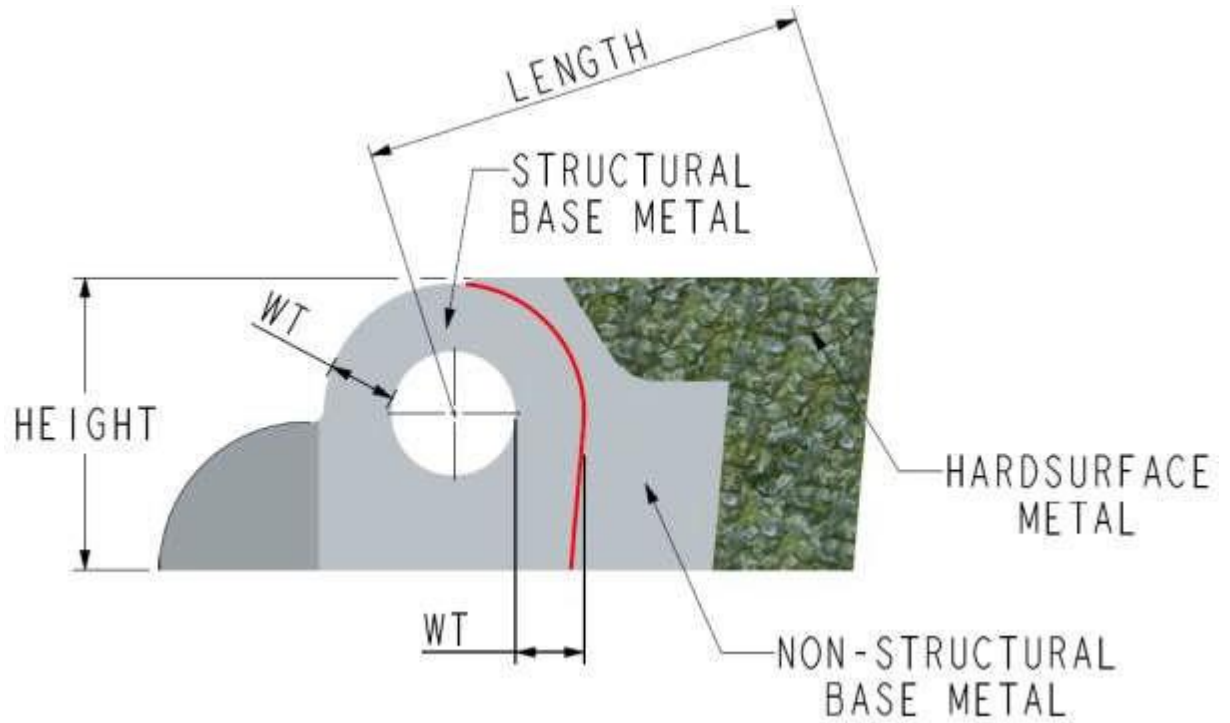


6.6.4 Figure of base metal classification for knives with length to height ratio greater than 2.5

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

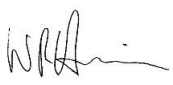
 Weatherford	INSPECTION SPECIFICATION					APPROVAL:  9/13/2022
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 23	
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						



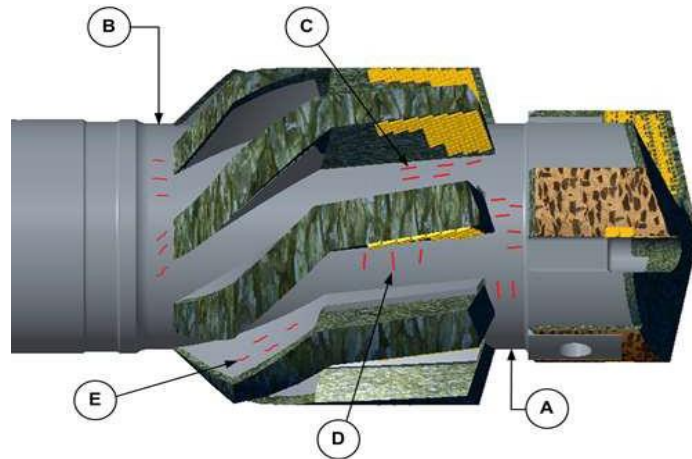
6.6.5 Figure of base metal classification for knives with length to height ratio less than 2.5

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

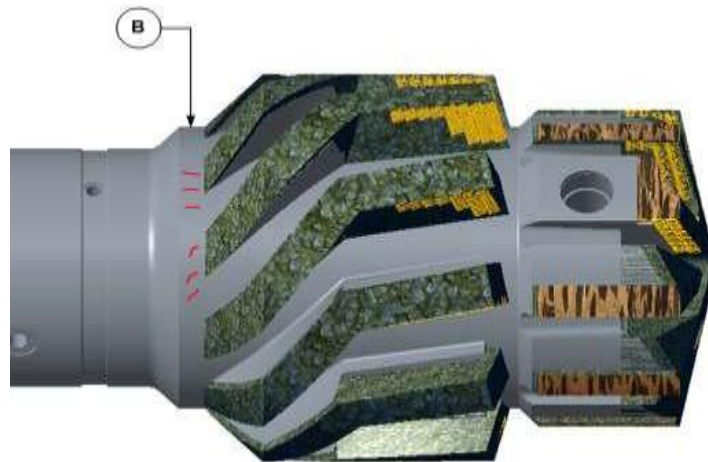
This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					APPROVAL:  9/13/2022
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 24	
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						

6.7 QC Lead Mill, Flex Mill, Secondary Mill, Steering Mill.



Lead Mill below 13-3/8" size



Lead Mill 13-3/8" and above

6.7.1 Figure of Lead mill; depicted are (1) heat cracks in reduced neck diameter (A) & (B), (2) Longitudinal cracks between blades (C), (3) Circumferential cracks between blades (D), (4) Cracks in non-structural base material.

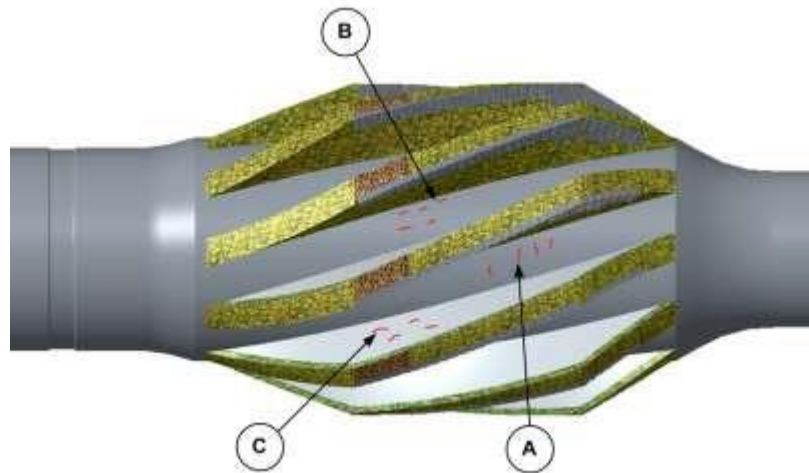
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					APPROVAL:  9/13/2022
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 25	
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						



6.7.2 Figure of Lead mill; depicted are (a) an indication around the Jamnut port and (b) Cracks around circulation ports.

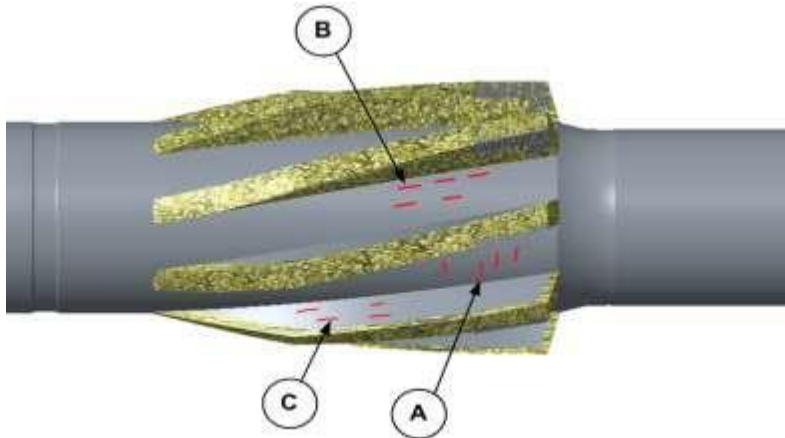


6.7.3 Figure of Flex mill; depicted are (1) Circumferential cracks between blades (A), (2) Longitudinal cracks between blades (B), (3) Cracks in non-structural base material (C)

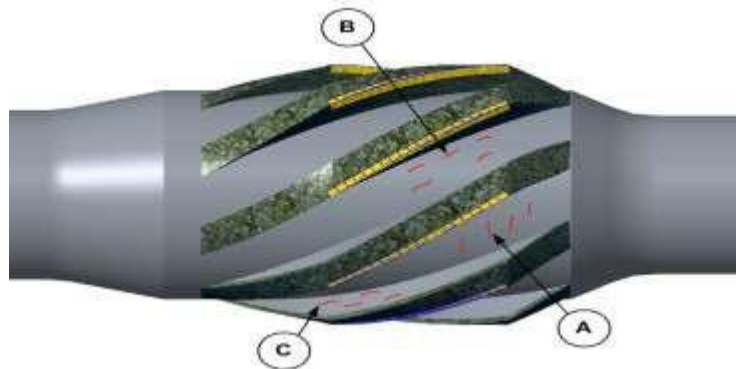
Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford. upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 26
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



6.7.4 Figure of Secondary mill; depicted are (1) Circumferential cracks between blades (A), (2) Longitudinal cracks between blades (B), (3) Cracks in non-structural base material (C)



6.7.5 Figure of Steering mill; depicted are (1) Circumferential cracks between blades (A), (2) Longitudinal cracks between blades (B), (3) Cracks in non-structural base material (C)

Review and Approved by: 

Michael Jennette
ASNT Level III, MP, LP, VT, UT, MFL Cert # 114633

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 27
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

7.0

APPENDIX II- TERMINOLOGY AND METHODS OF MEASUREMENT.

7.1.1 DEFINITONS:

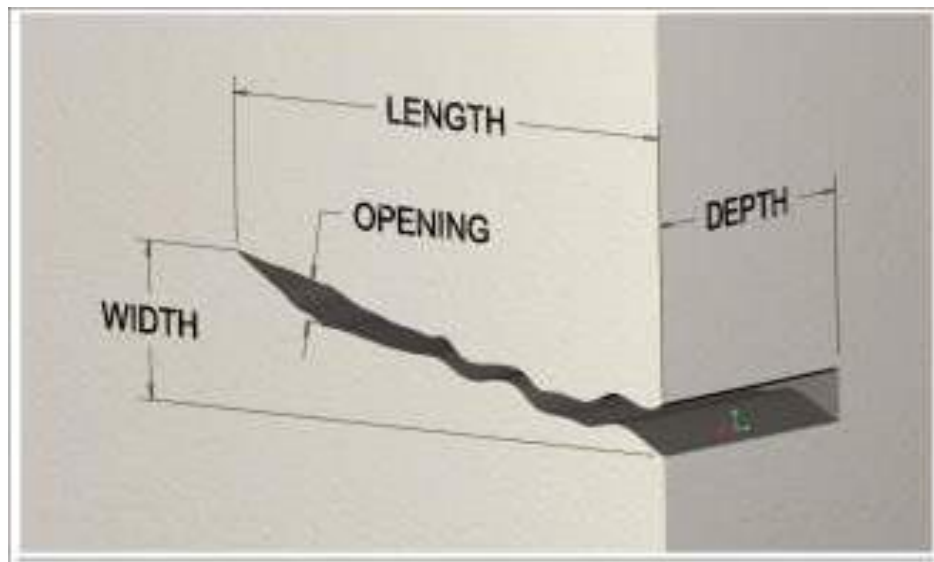
RELEVANT INDICATION- The relevant indication size is defined as 1/16” in length or greater.

LINEAR INDICATION-A linear indication is defined as an indication that has a length three times or more than its width.

CIRCUMFERENTIAL INDICATION- Indications in the hardmetal that hook or turns circumferential or at a right angle of the long axis.

ROUNDED INDICATION- is a shape with a length equal to or less than its width

- 7.1.2 Indication dimensioning is completed by measuring the indication along each axis. Each measurement is recorded by its corresponding term in the image below. Length, Opening, Depth, and Width are all needed to accurately evaluate the indication.



Uncontrolled unless stamped with a RED “Q”. © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford. upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 28
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					

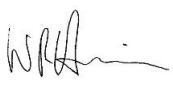
- 7.1.3 Measuring the opening or depth of an indication can be done with multiple gauges, with or without an examination medium. Depending on the indication orientation as well as the allowable depth, Digital Pit depth gauges may need to be used for the accurately measure indications in the 1/16" (.0625") or smaller range.



- 7.1.4 Examination mediums such as Reprorubber® Putty are used to reproduce surface characteristics. It can reproduce surfaces down to submicron particles or scratches. This medium is typically used in hard to reach areas of the tool where pit depth gauges will not reach, or there is no flat surface to measure off of.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION					
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 29	APPROVAL:  9/13/2022
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment						



- 7.1.5 Grinding Indications for depth evaluation is a very precise task. Recommended tools for this task are straight die grinders with a radial end diamond cut carbide burr. Radial ended burrs allow rounded corners when grinding and reduce the potential stress risers in the parent metal. After the grinding and measuring process is completed, and the tool is deemed acceptable by the acceptance criteria herein. The investigation area shall be ground using a sanding disk to blend the surrounding surface so as to avoid sharp notches, crevices or corners.

Uncontrolled unless stamped with a RED "Q". © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.

 Weatherford	INSPECTION SPECIFICATION				
	REV: G	SECTION: Testing	NUMBER WT-131	Prepared by: Rich Green	PAGE 30
TITLE: Surface Inspection Requirements for Milling and Cutting Equipment					



Uncontrolled unless stamped with a RED “Q”. © Weatherford, 2021, All rights reserved

This document is copyrighted and whether containing patentable or nonpatentable subject matter is and comprises the proprietary and confidential information of Weatherford and by receiving this document the recipient agrees that this document is loaned in confidence with the understanding that neither it nor the information in it will be reproduced or disclosed, in whole or in part for any purpose except the limited purpose for which it is loaned. This document and any facsimiles hereof shall be returned to Weatherford, upon demand.